

are optionally substituted by F or a C₄-C₁₂ aryl group and/or one or more non-adjacent -CH₂- units are optionally substituted by C₄-C₁₂ arylene, -O-, -S-, -CO-, -COO-, -OCO-, -SO-, -SO₂-, -N(R³) or -N(R³)CO-, and where R³ is C₁-C₂₀ alkyl, or in which R is a C₄-C₁₂ aryl group which may or may not be substituted;

~~said organic electroluminescent device being capable of providing a~~ the service life of said organic electroluminescent device being enhanced to at least 45 h when driven at a constant current, at an initial brightness of 200 Cd/m², and at an ambient temperature of 80 °C., said electroluminescent device also including a voltage source capable of providing a voltage sufficient to obtain said initial brightness of 200 Cd/m².

24. (cancelled)

REMARKS

The present Amendment is proposed in response to the Final Rejection mailed July 13, 2007. In the "Disposition of Claims" section of the Office Action Summary, Claims 13-16 were allowed; claims 17-20, 23 and 24 were finally rejected; and claims 21 and 22

objected to. The present amendment (a) amends Claims 13 and 23 to change the phrase "in which in" to --in which-- to correct an obvious typographical error; (b) amends Claims 17 to 20 to recite electroluminescent devices comprising aryl-substituted poly-p-arylenevinylene consisting of a repeating unit of the formula (C1); (c) amends Claims 17 and 23 to more clearly define the invention by positively stating the unexpected properties of the electroluminescent device; d) amends Claims 21 and 22 to correct the obvious errors in the formulae drawings noted in the Examiner's objections in Paragraph 8 of the Office Action, notably (1) in each formula, placing the "0.35" outside the first bracket for an adjacent repeating unit; (2) in formula (C6), inserting the second bracket for the third repeating unit and correcting the second bracket for the second repeating unit; and (e) cancels claim 24, without prejudice, to expedite the prosecution of this case.

Entry of the amendment is respectfully requested since it is believed to obviate all of the Examiner's reasons for rejection and objection in this application, and places the application in condition for allowance and in better condition for appeal without injecting new matter or raising new issues.

Reconsideration and allowance of the rejected claims is respectfully requested.

Upon entry of the proposed amendment, claims 13-23 are now in this case.

Claims 17-20, 23 and 24 stand finally rejected under 35 U.S.C. 102 (b) as anticipated by WO 99/24526, referring to US2002/0064680 as representing a translation of the international application published as WO 99/24526 to Spreitzer et al. Claims 17-20, as amended by the presently proposed amendment, are no longer subject to this ground of rejection for all of the reasons set forth for the allowance of claims 13-16 and 21-22. It is submitted that such

a rejection when applied to claim 23 is untenable, should be withdrawn for all of the reasons of record, and all the claims allowed.

Spreitzer et al fails to anticipate because, among other reasons, it fails to teach each and every element set forth in the claims. The cited reference is assigned to Aventis Research and grew out of a joint development research agreement between Aventis Research and applicant's Assignee, Koninklijke Philips Electronics. Although there is an overlap of similar subject matter between the publication and the instant application, the disclosures are not identical, the reference fails to teach all of the limitations of the claims, i.e. the unexpected properties exhibited by EL devices of this invention, now recited in all of the claims. At page 29, the polymers of the reference are said to be prone to the occurrence of unwanted triple and single bonds (or a Tolan-Bisbenzyl defect (TBB) or defective bonds) which adversely affect the service life of EL devices derived therefrom. The TBB of the polymers illustrated in this reference is given in Tables 1 and 2. It should be noted that Polymer V2 (included among the polymers disclosed to be comparative examples not in accordance with the invention of Spreitzer et al) has a structural description that appears to be similar to polymers incorporated into the EL devices claimed herein and other polymers P2, P3, P10, and P16 disclosed in Spreitzer et al; however, Polymer V2 has a TBB and service life that is undesirable according to Spreitzer et al. On the other hand, Polymers V5 and P4 have a structural description that appears to be similar to polymers that are not in accordance with the present invention and are not comparable to the polymers of this invention in enhancing the service life of an EL device (see comparative example 1 of the present specification, for example) but according to the reference have a TBB and service life that is highly desirable therein. Similarly, Polymers P6 and P8 having a

structural description that appears to be similar to polymers utilized herein barely make Spreitzer et al's range of satisfactory TBB, and Polymers P9 and P12 having a structural description that appears to be similar to polymers utilized herein are in Spreitzer et al's undesirable range of TBB, indicating relatively poor service life properties according to Spreitzer et al. Finally, Polymers P7, P11 and P13 of the reference (See page 32) are taught to have a desirable TBB and service life according to Spreitzer et al but this is in direct contradiction to the results obtained in Comparative Example 2 of this application wherein it is illustrated that a polymer having the repeating unit (C7) does not give rise to EL devices that possess the unexpected properties described in the present claims. Thus the reference as a whole cannot be said to disclose the present invention and in fact teaches away from the present invention with a disclosure of polymers that exhibit properties /results that are diametrically opposed to the properties/results obtained in the EL devices claimed herein.

It is well established that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Manual of Patent Examining Procedure* § 2131 (8th ed., Rev. 4, Oct. 2005), citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). The standard for rejection under 35 U.S.C. § 102 is identity. WO 99/24526 in particular does not disclose the service life limitations now recited in all of the claims, e.g., an organic electroluminescent device that is capable of providing a service life of at least 45h when driven at a constant current, at an initial brightness of 200 Cd/m², and at an ambient temperature of 80 °C. The reference therefore fails as an anticipatory reference.

The Examiner deems the service life limitation to be inherent

in the prior art devices made with polymer 9. Yet as pointed out above, based on patentee's description of the TBB content and its effect on service life, the contraindications of the reference when compared to the instant invention and vice versa, it cannot be said with certainty that the claimed service life limitation is inherent in electroluminescent devices produced from the prior art polymers. Based on this logic, it would be expected that the service life limitation would be inherent in the device derived from Polymers 7, 11 and 13 of the reference, yet the applicant's Comparative Example using polymer with repeating unit (C7) demonstrates that this emphatically is not the case.

Inherency arises when a single prior art reference fails to disclose the claimed invention per se, but the natural and invariable practice of the reference would necessarily and inherently meet all of the elements of the claimed invention. *Ethyl Molded Products v. Betts Package, Inc.*, 9 U.S.P.Q. 2d. 1001, 1032-1033. Inherency exists only when the prior inherent event can be established as a certainty; that an event may result from a given set of circumstances is not sufficient to establish anticipation by inherency. See *Phillips Petroleum Co. v. U.S. Steel*, 6 U.S.P.Q.2d 1065 at 1076-1077, 673 F. Supp. 1278 (D. Del. 1987).

Probabilities are not sufficient for prior art to anticipate an invention inherently; a prior inherent event cannot be established based on speculation or where a doubt exists. *Id.*; *E.I. du Pont v. Phillips Petroleum*, 2 U.S.P.Q.2d 1545 at 1552, 849 F. 2d 1430 (Fed. Cir. 1988); *Schering Corp. v. Precision-Cosmel Co.*, 227 U.S.P.Q. 278 614 F. Supp. 1368 (D. Del. 1985) and many other cases.

Claim 23 is directed to an organic electroluminescent device which is capable of providing a service life of at least 45 h when driven at a constant current, at an initial brightness of 200 Cd/m²,

and at an ambient temperature of 80 °C.

None of these highly specific features, which are service life characteristics that were experimentally determined and are required of the claimed device, could have been established as a certainty without any doubt, based on what is disclosed in WO 99/24526. Claim 23 is not inherently anticipated. The service life characteristics of the claimed EL device could not have been predicted and are not suggested, absent improper reference to Applicant's disclosure.

Speculation based on mere structural or descriptive similarity is insufficient to establish inherent anticipation, in view of a legal standard that requires absence of any doubt.

Objective evidence or secondary considerations such as unexpected results, commercial success, long-felt need ... are also relevant to the issue of anticipation when the reference does not disclose every element of the claimed invention. Applicants' specification provides Examples 1 and 2, showing output comparisons of prior art copolymers of Spreitzer with polymers of the present claims. See Examples 1 and 2 pp. 9-14 of the specification as originally filed wherein Comparative Example 2 compares an EL derived from a compound (C7) having a structure similar to Polymers 7, 11 and 13 of the reference. The specification as originally filed thus subjected an electroluminescent (EL) device using a polymeric structure of Spreitzer to a service life test in which the device, the positive pole of the voltage source being connected to an anode and the negative electrode to a cathode, was driven at constant current and at an initial brightness of 100 Cd/m² while maintaining an ambient temperature of 70 °C. See p. 10 lines 9-12 in the specification as originally filed. The service life, defined as the time within which the brightness drops to half its initial value, thus determined was found to be about 180 h. See p. 10 lines 12-13 in the specification as originally filed. The

voltage increase needed to maintain a constant current during the service life was found to be about 0.015 V/h. See p. 10 lines 13-14 in the specification as originally filed. The service life at 20 Cd/m² and room temperature exceeds 5000 h, which demonstrates the drastic reduction of service life associated with the use of a higher brightness and an elevated ambient temperature of 70 °C. See p. 10 lines 14-17 in the specification as originally filed.

In comparison, when the EL devices including the polymers of the present claims (see for example formula C5 and C6) were subjected to the same service life test, the service life of the EL device comprising the polymer of formula (C5) was 925 h. The voltage increase was about 2 mV/h. By collecting the data for a large number of samples the service life is found to be at least 800 to 1200 h. See p. 11 lines 12-15 of the specification as originally filed. Similarly, the service life of the EL device comprising the polymer of formula (C6) was found to be at least 800 to 1200 h. The voltage increase was found to be about 1.5 to 2 mV/h. See p. 11 lines- 16-17 of the specification as originally filed. See other comparative examples in the specification as well.

The Examiner appears to take the position that that the service life limitations are unpersuasive because Polymers 6, 8 and 9 are structurally similar to the formulae claimed herein. Again, the Examiner totally overlooks the expectation in the art at the time the instant invention was made that while brightness of an EL device can be increased by increasing voltage, it is also well known that increasing the voltage also decreases the service life. As stated in the present specification at Page 1:

"Aryl-substituted poly-p-arylenevinylenes of the type mentioned in the opening paragraph and electroluminescent (EL) devices, polymer electroluminescent devices for short, comprising such polymers are disclosed in the international patent application WO 99/21936. Dependent on the particular structure, the polymers disclosed therein are capable of light emission in the green to red range of the visible spectrum.

The color of light emission does not shift when a polymer EL device comprising the known polymer is stored at elevated ambient temperatures for an extended period of time. Furthermore, the polymer EL devices comprising these polymers have a service life exceeding 1500 to 5000 h when driven at a brightness of 20 Cd/m². For many purposes however, a brightness of 20 Cd/m² is too low and a brightness of at least 100 to 200 Cd/m² is required. This is for example the case in a matrix display device which is driven in a time-multiplexed manner. Although the brightness of an EL device can be simply increased by increasing the voltage at which it is driven increasing the brightness generally leads, as is well-known in the art, to a substantial reduction in service life. A further substantial reduction in service life is generally observed when a polymer EL device is driven at elevated ambient temperatures such as 70 to 80 °C. However, satisfactory operation of the devices at those elevated temperatures for an extended period of time is a prerequisite for many applications. Such applications include display devices for automotive applications and mobile phones." (emphasis added).

Applicant again submits that structural formulae and descriptions of polymers are imprecise and cover a vast number of products. Applicant again points to *In re Papesch* as evidence that it has also long been held that a chemical compound is not limited to a formula or name but must be considered in the light of all its properties. See *In re Papesch*, 315 F.2d 381, 391, 137 USPQ 43, 51 (CCPA 1963) ("From the standpoint of patent law, a compound and all its properties are inseparable."). ("The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious."); *In re Jones*, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992) (Federal Circuit has "decline[d] to extract from *Merck & Co. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir. 1989)] the rule that... regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall

within it."). See also *In re Deuel*, 51 F.3d 1552, 1559, 34 USPQ2d 1210, 1215 (Fed. Cir. 1995). Moreover, a *prima facie* case of obviousness based on structural similarity is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963).

It is applicant's discovery that certain aryl-substituted poly-p-arylenevinylenes and EL devices derived therefrom as claimed herein have the ability to enhance the service life properties of EL devices comprising them and that said enhancement is not reduced by increasing the brightness or when the EL device is driven at a constant current, at an initial brightness of 200Cd/m², and at ambient temperatures such as 70 to 80 °C. This is neither anticipated by nor obvious from the prior art. The rejection is untenable and should be withdrawn.

In view of the above, it is respectfully submitted that the present application is in condition for allowance, and a Notice of Allowance is earnestly solicited.

Respectfully submitted,

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